TECHNOLOGY TRANSFER TOOLBOX
SCOPING STUDY

FINAL REPORT

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EXECUTIVE SUMMARY

The Need

Annually hundreds of millions of dollars are invested by state, federal, and university researchers to produce innovations and improvements to the transportation system. However, the benefits of these investments are dependent upon the ability to deploy and implement the results of research – the innovations, technologies, new methods, and procedures. Coupled with this responsibility to put into practice what has been learned, there is a substantial need for effective and continuous sharing of best practices and new information among the transportation community. These factors point to a more basic need, that of creating and enhancing mechanisms to enable technology transfer, which is the term used for all the activities leading to the adoption of a new-to-the-user product or procedure as an accepted operating practice.

This scoping study describes a Technology Transfer (T^2) Toolbox – basic principles and concepts developed into tools to assist those engaged in implementation of innovations or technology transfer. These tools will be designed for use by researchers, research administration staff, and program, operations, and field staff, from the public or private sectors or academia. Ultimately the objective of the study is to make transportation innovations more readily available and usable through the use of effective tools and to inform sponsors of the value of developing these tools to more quickly realize the benefits of research implementation and technology transfer activities.

The T^2 Toolbox concept and this scoping study is put forth by the TRB Committee on Technology Transfer and the Federal Highway Administration. In addition, the TRB Conduct of Research Committee expresses its support for the concept of the T^2 Toolbox and will continue to provide input as the development proceeds.

The findings and conclusions from this T^2 Toolbox Scoping Study will be incorporated into the current National Cooperative Highway Research Program Synthesis Study: *Technology Transfer Successes, Challenges, and Needs*.

The Users

The largest group of potential users of the T^2 Toolbox is unfamiliar with technology transfer or implementation of research results and does not regularly perform these duties. They are expected to know what to do when they are faced with shepherding the promotion or adoption of an innovation in a specific technical discipline. These people can be field and operation staff, researchers, or others involved with the process of research. It will be this group that benefits the most by having the tools to assist them as they accomplish the necessary technology transfer tasks. Another group in the transportation

community, which could be served by the T^2 Toolbox, is made up of those who are knowledgeable about or involved in effective technology transfer or implementation of research results. While the T^2 Toolbox could assist this group, it will be designed primarily for the inexperienced user.

Users will be drawn from a variety of organizations and responsibilities within transportation. Individual users will come from 1) state departments of transportation: the research unit office technical and administrative staff and those that oversee the application of innovations into the operating environment, including district or region personnel; 2) the Federal Highway Administration Resource Center and division offices and others in the research and program areas; 3) universities including researchers and in particular students who will have the opportunity to prepare for their careers by learning to use these essential tools; 4) private sector researchers and organizations or associations dealing with promoting the use of new technologies and innovations for transportation; and 5) technology transfer agents or those involved in facilitating effective technology transfer and research results implementation.

T^2 Toolbox Components

The T^2 Toolbox will contain an Implementation Tool encompassing a group of applications necessary for effective implementation of research results or technology transfer. The various modules of this tool will enable the T^2 Toolbox user to prepare implementation action plans, marketing plans, and executive briefing presentations and reports and other communication materials.

> Implementation Plan Module will produce documents that allow the user to express strategies for facilitating the adoption or application to practice of an innovation or technology. Implementation plans contain items such as concise description of the innovation or technology, anticipated benefits of and barriers to implementation, identification of the primary users, schedule for implementation, identification of stakeholders and funding sources and amounts, description of implementation/technology transfer activities and resources required, identification of evaluation strategies to monitor the effectiveness of the implementation, and other items such as naming of champions and detailing pathways for approvals.

> Marketing or Promotion Plan Module will focus on a narrower and more in-depth aspect of the implementation process – promotion of the innovation or technology and communication about it. Marketing plans are documents that assist the user in identifying the promotional strategies that can be used to facilitate implementation or technology transfer activities. Marketing plans contain in-depth analysis such as: situation analysis, describing the important characteristics and features, operations,

and use of the innovation and its improvement over current practices, the benefits of the innovation and the realized improvements, the profile of the market – where the innovation will be used and by whom, the market's characteristics and players and their roles, the opportunities and barriers in promoting the innovation, goals and objectives in promoting the innovation, strategies and resources required for promotion, timing of the activities, and measuring the effectiveness of the marketing planning effort.

Executing Briefing Module prepares a briefing presentation for senior management, which includes the elements important at an executive level -- need assessment and problem description, technology or innovation description, profile, and background, current practice, market profile, risks and rewards, costs including implementation and maintenance costs, funding sources, and short- and long-term goals and objectives.

In addition the T^2 Toolbox will include a Scheduling and Tracking Tool that will foster more effective management and monitoring of implementation and technology transfer efforts.

A scheduling and tracking tool would include technology transfer activity timelines, elements of the processes being performed, critical accomplishments, resources needed or expended, and summary capabilities to present an overview of activities and their status.

Built into the two primary tools will be the capability to assess the effectiveness of the tools as they foster implementation and technology transfer and the ability to identify whether or not (and if not, why) outcomes are achieved.

Two Phases of Development

There are two phases of development of the T^2 Toolbox. Both phases lead to creating a primary technology transfer resource for the transportation research and technology community. The first phase of development will create an interactive CD based system with accompanying hardcopy that can be used on a personal computer or installed on an intranet (if available) within the user's organization. The second phase of the system would advance this CD based system to an interactive web-based system accessible through commonly available internet browsers. The two-stage approach came about because those providing input to this study realized that there are many in the transportation community that still do not have full access to the Internet. The T^2 Toolbox will be dynamic, providing prompts and suggestions for information input and will include some internal-to-the-system intelligent decision-making. Professionally formatted reports will be produced from the tools as needed.

The vision of the project panel and those who supplied input for this scoping study converge at these critical points required for the development of the T^2 Toolbox:

- The T^2 Toolbox content must be developed first
- The tools in the T^2 Toolbox should be interactive/decision directed
- A CD based delivery mechanism is a desirable format for the T^2 Toolbox for an initial, interim version
- A web-based interactive T^2 Toolbox should be the ultimate delivery mechanism and the goal of any effort committed to developing the T^2 Toolbox
- A means of sharing successful practices should be built into the web-based system

What Next

The T^2 Toolbox must move from concept to reality. It is time to develop the T^2 Toolbox. There is a large base of support within the transportation community for more effective implementation of innovative practices to advance the transportation system. Starting the development as soon as possible and extending the development no longer than 24 month is recommended.

The T^2 Toolbox needs a vehicle to house and support the development efforts. The state departments of transportation can particularly benefit from the T^2 Toolbox and because of this, the State Planning and Research supported Pooled Fund Program or the AASHTO joint development process could be an excellent vehicle to house the development effort.

The T^2 Toolbox requires resources to develop a practical, usable system. Resources will be needed for developing the T^2 Toolbox, including both the Implementation Tool and the Scheduling and Tracking Tool, in both a CD version and a web-based version. Funds for the technical development of the two primary tools for the T^2 Toolbox are estimated to be $500,000. These funds include 1) an estimated $400,000 for the technical development of the Implementation Tool – which consists of Implementation Plan, Marketing (Promotion) Plan, and Executive Briefing modules, 2) an estimated $100,000 for the Scheduling and Tracking Tool, and 3) the ability to examine the effectiveness of the tools. These estimates do not include the funding required for the policy and technical oversight and administrative functions, extensive implementation activities, or the administrative support required to manage the development effort. Such administrative, implementation, and management support should be sought through in-kind contributions from sponsors of the T^2 Toolbox.

The T^2 Toolbox needs sponsors and partners to help in development and funding. FHWA, AASHTO, and university transportation centers are excellent potential partners for the State DOTs in development of the T^2 Toolbox. These partners can contribute technical, administrative, and financial resources. In fact, if 10 states agreed to contribute up to

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$30,000 for two years and other partners contributed in-kind services for policy, technical, implementation, and administrative support, the T^2 Toolbox would have more than sufficient resources for successful completion.

Investment for Transportation

Developing the T^2 Toolbox is an investment in the transportation system. The tools it contains will multiply the benefits of the current implementation efforts. In particular the T^2 Toolbox will allow more rapid application of innovation to transportation by maximizing efforts for implementation of research; by enhancing market penetration for innovations; and by substantially increasing the associated benefits of broader implementation. The T^2 Toolbox will help to prevent delays in adoption of better practices, enable users to avoid unseen liabilities, and assist in overcoming technical or administrative barriers in implementation. These tools need to be in the hands of practitioners to produce efficiencies and create more value for the existing and future transportation assets. The consequences of not having the benefits of such innovations also present a strong reason to move forward with this T^2 Toolbox. Consider that without an implementation plan or a marketing strategy, labor, equipment, materials and other physical costs can rapidly multiply. Additionally, the costs are even greater for not having an innovation in place and not realizing the full benefits of the innovations and not having an efficient capability to share best practices. Developing the T^2 Toolbox is a needed investment. Using these tools will trim the cost of technology transfer and implementation efforts and increase the stewardship of transportation resources through more effective and rapid application of innovations.

CHAPTER 1. INTRODUCTION

PURPOSE OF THE STUDY

Each year hundreds of millions of dollars are invested in public sector transportation research through federal and state programs and private sector and academic efforts. Realizing the benefits of this primarily applied research investment is dependent upon moving the research results into practice. For this reason, the process of technology transfer, including implementation of research results, is a key element for transportation innovation. Yet often such innovation does not occur without planned effort to assist in its accomplishment. Improvements in implementation of research results and technology transfer are required to enhance the innovation process. There is a need for continuous and effective sharing of best practices and new information. Furthermore there is a general call for more effective mechanisms to deliver technology transfer information and to prepare practitioners for implementation of new processes, methods, and technologies.

To address these needs, this scoping study describes a system of principles, concepts, and tools to assist those engaged in the technology transfer process, that is the researchers, research administration staff, and program, operations, and field staff. The objectives of the study are to 1) create a system that will foster sharing and use of best practices for implementation and technology transfer and 2) develop more effective mechanisms to deliver technology transfer information. The ultimate result of the development of the T^2 Toolbox will be to make transportation innovations more readily available and usable, to speed the process of innovation, and more quickly realize benefits for the transportation system.

DEFINITIONS

A number of terms familiar to the transportation community are used in this document. While many definitions for these terms may be acceptable, the following are used herein.

Adoption or Application to Practice: Making a technology or innovation an organization's standard operating procedure or causing the technology or innovation to be used as the generally accepted means for accomplishing a specific task. Such action is an outcome of implementation of research results or technology transfer activities.

Technology Transfer: The activities leading to the adoption of a new-to-the-user product or procedure by any user or group of users. New-to-the-user means any improvement over existing technologies or processes and not only a recent invention or research result. Technology transfer includes research results implementation. Activities leading to the adoption of innovations can be knowledge transfer and education, demonstrations and

showcases, communications and marketing efforts, technical assistance, and more. (Wallace, 1998 and Schmidt, Mulroy, and Beinborn, 1984)

Implementation of Research Results: Used in highway transportation and particularly by the research community to describe the various activities required to put an outcome of a research project into widespread use. The activities can span the entire duration of the research project and extend until the research result is adopted, for example, as part of a standard operating procedure. Implementation activities may be pilots or demonstrations, training, technical assistance, provision of needed resources, or any activity that fosters use of the research result.

Deployment: The systematic process of distributing an innovation for use within an organization. This term implies a relatively broad use, rather than pilot, demonstration, or incidental use of the innovation.

Innovation: A procedure, product, or method that is new to the adopting organization. The item may be a result of research or may be a new application of an existing improvement that has been used in another context or other organization.

Technology: A term used very broadly to include practices, products, processes, techniques, and tools.

BACKGROUND

Transportation research has the potential to provide solutions to critical and long-standing problems. Through applying the knowledge gained or putting into practice the innovations developed, research activities can be a means to increase the value of the transportation system's assets, enable better stewardship of the resources required to accomplish the tasks at hand, and enhance the safety of the infrastructure and its operations.

The pressures of providing safe and reliable services and superior infrastructure have demanded more effective research that solves long-standing problems and enhances services. Therefore to meet these demands, during the past number of years, implementation of research results has been a particular focus within the transportation research community. Increased emphasis on implementation creates a faster application of innovations and a more rapid approach to addressing customer needs and concerns.

In recent years, implementation and technology transfer activities have also involved greater numbers of operating personnel as participants in the adoption of innovations. Creating a more extensive base for promoting research results at the point closest to the ultimate user has added to the speed of getting innovations applied to practice.

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Implementation of research is an example of the set of activities that are used to apply innovative practices. These activities are usually focused on recently completed research results. They also may deal more broadly with other innovations, very often an existing procedure, product or method that is new to an organization and successfully being used elsewhere. The term most frequently used for this broader scope for adopting or applying innovations to practice is technology transfer.

Whether one refers to implementation of research results or technology transfer, both implementation and technology transfer efforts are faced with similar issues, a critical one being resource constraints. Unfortunately resources are less than adequate. Research management often finds that implementation of research results costs substantially more than anticipated. Additionally, those performing technology transfer find that the resources to perform their tasks often must come from strained research or operating budgets. Nevertheless, funds and expertise committed to implementation and technology transfer activities have the potential to provide substantial benefits to the adopting organizations. Importantly, these benefits are significantly greater than the initial investment. (Harder, 2000)

Much has been done to assist those seeking to realize these benefits and incorporate innovations into their agency's or organization's operations. One of the primary examples of these efforts was the former Federal Highway Administration (FHWA) Office of Technology Applications. This office was the agency's central focus for accomplishing technology transfer and assuring that research results and other promising innovations were given assistance to speed application to practice. The office set the pattern for what is now an ongoing responsibility. Such efforts are now shared by the FHWA Turner-Fairbank Highway Research Center (TFHRC), and the agency's program offices and Resource Center. Another example is the lead states process set up for implementation of Superpave, a result of the Strategic Highway Research Program (SHRP). That effort along with the American Association of State Highway and Transportation Officials (AASHTO) SHRP Implementation Task Force set a standard for nationwide implementation and technology transfer. The AASHTO Technology Implementation Group (TIG) has taken on the responsibility to continue this important mission. TIG seeks to "champion the implementation of technology among AASHTO member agencies, local agencies, and their industry partners to improve the nation's transportation system." (http://www.aashtotig.org). Another current example of technology transfer efforts is the federal-aid supported Local/Tribal Technical Assistance Program (LTAP/TTAP). The program's mission is "to foster a safe, efficient, environmentally sound transportation system by improving the skill and knowledge of local transportation providers through training, technical assistance, and technology transfer." (http://www.ltap2.org/program.htm) Further are the efforts of the TRB Committees on Technology Transfer and Conduct of Research which both, in support of their technical missions, foster the application of innovations to the transportation system.

Yet all of these examples of technology transfer efforts have few, if any, standardized tools to assist the individual in his or her responsibilities of assuring that successful innovations are applied to the work environment. The FHWA Office of Professional Development and the Transportation Research Board Committee on Technology Transfer determined that more must be done to assist the transportation community in its research results implementation and technology transfer efforts. These two groups along with input from the TRB Committee on Conduct of Research purposed to provide a solution to improve technology transfer and innovation adoption.

The needs exist in two areas. Most importantly there is a strong need for tools that can assist those who do not regularly perform technology transfer, yet are expected to know what to do when they are faced with shepherding the adoption of an innovation in a specific technical discipline. There is also a need for more effective tools for those who regularly perform or have some have some knowledge of technology transfer processes or the activities involved with implementation of research results.

In response to these needs the FHWA and the TRB Technology Transfer Committee developed the concept of the Technology Transfer (T^2) Toolbox. The T^2 Toolbox would provide the necessary guidance and tools to enhance the implementation of research results and technology transfer activities being performed in the transportation community. With funding and technical guidance from the FHWA, Office of Professional Development and technical guidance from the TRB Technology Transfer Committee, a scoping study was commissioned. This study is designed to develop a T^2 Toolbox resource, to guide the planning of the implementation and technology transfer tools, and to engage the transportation community as partners and sponsors.

STUDY METHODOLOGY

Information collection and input from potential users was foundational for this study. Four major steps were involved in the gathering of information about the state of practice in the areas of implementation of research results and technology transfer. Initially, a literature search was performed to determine the published and online resources regarding implementation and technology transfer and related tools used in the public sector transportation community. This search included identifying and collecting information produced by the TRB Technology Transfer Committee, including valuable preliminary materials about the T^2 Toolbox. The search also yielded a number of publications that discussed the need for enhanced processes to perform technology transfer, some that discussed successful implementation and technology transfer experiences, and others that described case studies of typical technology transfer responsibilities. Several comprehensive documents on technology transfer are oriented toward the experiences of the Local Technical Assistance Program. While there was much recounting of successful experiences there were no published standardized tools endorsed by a critical mass of those involved with technology transfer or implementation of research results.

A second step for gathering information for this study was interviews, telephone conversations, and correspondence with users of technology transfer, including those who are responsible for or who promote implementation of research results.   A variety of professionals in transportation provided invaluable information: FHWA Resource Center technical experts and division personnel, state department of transportation research program managers and implementation staff, and university researchers. Discussions with these individuals focused on the tools needed by those involved in implementation and technology transfer activities.

Additionally a short survey was distributed to the Research Advisory Committee (RAC) of the AASHTO Standing Committee on Research. The survey asked these essential participants in implementation and technology transfer about their preferences for a delivery mechanism or format in which the T^2 Toolbox could be delivered to users. The four choices covered a range from hardcopy workbook to a fully electronic web-based system.

The second question of the survey to the RAC presented a number of tools that could be contained in the Toolbox and asked for the RAC respondents to provide a priority ranking of the tools. Tools presented included implementation planning, marketing plan preparation, effectiveness assessments, and others.

Most importantly, the scoping study's project panel provided key information. The foundational strategies and perspectives on users and their needs were central to the formation of this document.

As information a list of those contacted for input to this study is included as Appendix A and a copy of the short survey sent to RAC members is included as Appendix B.

REPORT ORGANIZATION

This report contains an introduction, Chapter 1, which discusses the purpose and background of the T^2 Toolbox, provides several relevant definitions, and identifies the sources of information received to accomplish the study. Chapters 2 though 7 discuss the concept, the users and their needs, the tools, and the platform for the T^2 Toolbox. Chapters 8 and 9 present information on the next steps following the scoping study. Chapter 10 includes a summary of the study and its findings and recommendations. The Appendices contain lists of contacts made during the course of this study, the short survey to RAC members, and a suggested list of communication/outreach tools.

CHAPTER 2. TOOLBOX CONCEPT

GENERAL DESCRIPTION

As a primary function the T^2 Toolbox seeks to provide those who are unfamiliar with technology transfer or implementation of research results and do not regularly perform these duties with the principles, concepts, resources, and tools they will need for more effective results in applying to practice new processes, methods, and technologies to improve the transportation system.

Just like a home contractor's toolbox that contains specialized tools for specific tasks, the T^2 Toolbox will contain tools each designed to perform a given task associated with technology transfer and implementation.

Based on input from the potential users, the T^2 Toolbox is a series of interactive programs or modules that create products to effectively conduct selected technology transfer and implementation activities. The T^2 Toolbox will have comprehensive and easy-to-apply instructions for its various modules. Depending on the user and the type of technology transfer service required, the user will generate a strategy, a plan, a monitoring or analysis system, or other process application. The outcomes of the chosen tool will provide direction in accomplishing a specific technology transfer activity.

DELIVERY MECHANISM FOR THE T^2 TOOLBOX

Availability and access to the T^2 Toolbox is a primary factor for the users. A variety of the potential users of the T^2 Toolbox, or those who interact with potential users, were asked to describe the most convenient or easily accessible mechanism to deliver such a toolbox to the broadest number of users.   Four basic choices were provided that spanned a range from non-electronic to Internet/web-based:

- Workbook (with reproducible forms), hardcopy only
- Workbook accompanied by a CD (generates plans and hardcopy) that can be used on a PC or installed on an agency's intranet
- DVD (generates plans and hardcopy) that can be used on a PC or installed on an agency's intranet
- Web-based, requiring access to the Internet

The type of user was frequently cited as a criterion for determining a preferred mechanism for delivery. The main concern of those offering input was the degree of access a potential user had to a computer system. The greater the access to electronic systems, the more technologically sophisticated the preferences became. However, most of those providing information realized that technology transfer can often be performed in field or operating conditions where there may not be access to the most sophisticated computing resources.

Thus the preference for a delivery mechanism was a two-staged system – first being an interactive CD based system that has accompanying hardcopy that can be used on a personal computer or installed on an intranet (if available) within the user's organization. The second stage of the system would advance this CD based system to an interactive web-based system accessible through commonly available internet browsers.

The two-stage approach came about because those providing input to this study realized that there are many in the transportation community that still do not have full access to the Internet. Furthermore, the portability of a CD based system that can generate products and provide guidance without having to have the internet connection, even if it was available, was seen as having broader usefulness. The step up to an internet accessible system was seen as having substantial advantages because of the ability to link to other sources relevant to the technology transfer activity, as well as capture successful practices.

The project panel envisioned a staged development process as well. The first stage developed the basic content and as envisioned by many who provided perspectives for this study creating a CD. Then in three subsequent stages the panel proposed to develop a comprehensive web-based tool. The three stages of web-based development are as follows:

> *Web-based Information and Guidance*
> The non-interactive materials developed would be posted on a website. The index for the website could help researchers jump to specific information that they needed immediately. The website would include a set of questions that could serve as a worksheet for developing specific technology transfer or implementation tools. In this stage of web-based development, the information would be fairly passive and primarily serve as a linking point to connect with technology transfer resources.

> *Web-based Interactive System*
> The Toolbox website would be advanced to serve as an interactive tool to help develop products such as marketing plans. This makes the transfer from the CD interactive system to a web-based system accessible by an internet browser. By using the tools and specific information, the user would generate a customized plan for the technology transfer scenario. The program would operate like an expert system moving the user through various decision points and choices. The advantage to this approach is that it would create a product that would be immediately useful to the user as well as have links to resources and contacts relevant to the technology transfer process or the specific innovation.

> *Web-based Expert System and Implementation Database*
> The final stage of web-based development builds on the interactive system
> by adding an accessible database for sharing the outcomes of products
> developed by the tools in the Toolbox. For example, if one organization
> developed a marketing plan for a promising technology, the plan and the
> progress of carrying out this plan could be made available for others to use
> for similar efforts in other locations. Such a database would prevent
> duplication of effort and capture successful practices. (Toole, 2003)

In summary, the vision of the project panel and those who supplied input for this scoping
study converge at these critical points required for the development of the Toolbox:

- The T^2 Toolbox content must be developed first
- The tools in the T^2 Toolbox should be interactive/decision directed
- A CD based delivery mechanism is a desirable format for the T^2 Toolbox for an
  initial, interim version
- A web-based interactive T^2 Toolbox should be the ultimate delivery mechanism
  and the goal of any effort committed to developing the T^2 Toolbox
- A means of sharing successful practices should be built into the web-based system.

CHAPTER 3. USERS OF TECHNOLOGY TRANSFER SERVICES

TWO BROAD CATEGORIES OF USERS

There are a variety of individuals in the transportation community that could benefit by having tools to perform technology transfer activities more efficiently and effectively. The two broad groups of these users of technology transfer are a large and diverse group of users of technology transfer. These often are the individuals who are charged with getting innovations applied and may be researchers (university or public agency staff) or research administration staff who do not have training or experience in implementation or technology transfer activities, or are field or operation personnel in the location where the innovation is to be used. Because these individuals' main expertise is aligned with their respective technical discipline and not implementation or technology transfer, there is a greater need for tools that can assist them. These individuals must perform technology transfer or implementation as a collateral duty to their primary responsibilities; they often are inexperienced with the processes required, and they have little time for added tasks in their already full workload. The second broad group of users performs technology transfer or implementation activities as a recognized work responsibility. This group is substantially smaller and more knowledgeable about the activities involved with technology transfer, however they too can be more productive and effective by using the tools proposed in the T^2 Toolbox.

Users with Collateral Responsibility for Technology Transfer – Researchers and Those Seeking to Promote Innovations

The broader use of a T^2 Toolbox will be with those who need to perform implementation of research results or technology transfer tasks as a collateral duty. These individuals desire to improve or make advancements in the operations or technical performance of their organization or their client's organization yet the technology transfer or implementation effort must be done in concert with other full-time responsibilities.

In general the people that are performing these implementation or technology transfer or implementation activities are located in 1) agencies or universities as researchers interested in the success of the innovation they have produced, 2) a research administration office and not specifically associated with the technical area in which the innovation will be applied, or 3) operations, program, and project offices, and field offices, and they are close to where the innovation or research result will be used.

The agency and university researchers are an arm's length away from the area where the innovation will be applied and like the research administration staffs, want to see a successful use of their efforts to create solutions through their research, yet, these researchers are primarily focused on their technical discipline. The users that are members of a research staff, either in a research or administrative capacity, want to see the project

successfully completed and make sure the products of the research program are useful and relevant to the organization – and likewise their primary skills are not focused on implementation. The users in operations areas are asked to participate in the technology transfer or the implementation activities because they are experts in the area in which the innovation will be applied – not because they know how to assure adoption of an innovation.

The most important aspect is that these users, no matter where they are located in an organization, are not experts in technology transfer or implementation of research results. If they had tools to assist them in the most effective use of the methods and processes of technology transfer, had resources and information that would provide guidance and assistance for identified tasks, and performed them reliably and with greater ease of use, greater numbers of innovations would be applied to the transportation system at an increasing pace.

Technology Transfer and Implementation Experts

There is a minority of trained and experienced technology transfer and implementation experts within the transportation community. In transportation agencies the highest concentration of these experts are responsible for LTAP or TTAP efforts or in the FHWA Resource Center. Some of these experts are responsible for implementation of research results as a part of the management and administration of research, and many fewer perform technology transfer as a primary function within a technical discipline. Tight budgets and higher priority activities often supersede adding these unique skills to an organization. Yet for organizations who do have such experts, tools that are reliable, take less time to accomplish the task at hand, and are proven to be successful can be a significant help.

Because technology transfer or implementation of research results is a primary job responsibility, many of these individuals have some informal processes to use in their various activities. Many also have learned by experience to approach a technology transfer problem in a specific manner. They perform their duties without a defined tool, yet they intuitively know what to do and accomplish the technology transfer or implementation in an orderly fashion. Where guidance, aids, and tools do exist often they require customization for each situation.

The T^2 Toolbox can assist these experts by providing an interactive system that generates more consistent and reliable outcomes. Moreover as the T^2 Toolbox progresses to a web-based system, additional information that supports the technology transfer effort will be available through links and accessible references. Tools from the T^2 Toolbox will enable those currently performing technology transfer and implementation of research results to be more efficient in their responsibilities.

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CHAPTER 4. USER NEEDS AND TOOLS

The T^2 Toolbox can have all of the tools that users indicate are needed. As the T^2 Toolbox is developed additional tools can be added as appropriate. The T^2 Toolbox should however have some immediately useful tools for a broad number of potential users. Many who provided input for this study stated that the tools for the T^2 Toolbox depended on the innovation to be implemented or the technology to be transferred. Yet in the user interviews, discussions and the deliberations of the project panel as well as the TRB committee, several activities stood out as candidates for the toolbox development, These items would take the form of a broadly applicable implementation tool that has a number of modules: implementation of promising innovations or technologies, marketing or promotion to further the understanding of their use, and a means to communicate about the innovation or technology through an executive briefing mechanism. Additionally, research managers and many others discussed a need for a tool that scheduled and tracked technology transfer activities. In concert with all the functions that would be contained in the T^2 Toolbox, potential users suggested that a means to assess the performance of the tools would be a valuable addition to each of the tools or modules.

In summary, to meet the needs of the potential users, two primary tools are suggested.
1) Broad-reaching implementation tool with modules for creating implementation plans, marketing plans, executive briefings, and other communications materials.
2) Scheduling and Tracking Tool to monitor and guide technology transfer activities.

Each of these tools is described below and users' perspectives are provided for the tool or its component module. The users' perspectives were a critical contribution for shaping the contents of the T^2 T Toolbox.

IMPLEMENTATION TOOL

Implementation help was seen as the most important tool for the T^2 Toolbox. Potential users described it as a broadly reaching tool, sufficiently flexible to apply to diverse innovations or technologies, and to contain modules that allow the user to perform to a number of levels of detail. Users wanted the option to drill down into an implementation tool to accomplish marketing planning and to be able to produce executive briefing and other communication materials from the information generated.

The implementation Tool has a variety of modules: Implementation Plan Module, Marketing (Promotion) Plan Module, and Executive Briefing Module.

Implementation Plan Module

Implementation Plan Module – this module will produce documents that allow the user to express strategies for facilitating the adoption or application to practice of an innovation or technology. Implementation plans contain items such as concise description of the innovation or technology, anticipated benefits of and barriers to implementation, identification of the primary users, schedule for implementation, identification of stakeholders and funding sources and amounts, description of implementation/technology transfer activities and resources required, identification of evaluation strategies to monitor the effectiveness of the implementation, and other items such as naming of champions and detailing pathways for approvals.

Users' Perspectives on the Implementation Plan Module

The Researchers and Research Managers in state DOTs indicated implementation planning was the most important function to consider for including in the T^2 Toolbox. Implementation plans are considered as a critical initial step in the path to adoption of an innovation. Implementation plans were seen also as a means to assign accountability to specific individuals, to determine a time frame for the activities, and to provide input to performance measurement systems and management briefings. A number of state DOTs have a format for implementation plans and regularly use them. Additionally, some state DOTs require a degree of implementation planning to be done as part of the proposal for a research project as well as have implementation planning be part of the deliverables of a completed research project. Other state DOT research managers acknowledged that their state just did not have the resources to focus on implementation. Therefore an interactive system to create an implementation plan was seen as an opportunity to begin the process for state DOTs that do not routinely create implementation plans. It was also seen as a resource minimizer for those state DOTs with few resources to commit to implementation plans and as a means to create efficiencies for those state DOTs that already create such plans.

University Researchers saw an implementation plan as more important to the adopting organization. However, NCHRP and some state DOT research organizations require an initial implementation plan to accompany the research project proposal as well as a more detailed plan be included in project deliverables. In the near future, researchers performing work for state DOTs may be a strong user of this tool. Members of the TRB Committee on Conduct of Research affirmed this perspective.

FHWA TFHRC, Resource Center, and Division Offices: Implementation plans were also seen as valuable tools within the FHWA. In particular, the TFHRC has a Technology Facilitation Action Plan process that often accomplishes implementation planning. The Resource Center and Division Offices also have responsibility for encouraging

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implementation, and would find this module valuable especially as they work with the state DOTs.

State DOT Technical/Operational Offices: An implementation or deployment plan is viewed as an important element by the operating organizations in state DOTs for assistance in technology transfer efforts. However, as has been discussed, operating staffs often do not have the time or the resources to commit to implementation activities. However, those who are committed to adopting new technologies, the champions of an innovation, may be very likely to use such this module. The implementation plan will help these innovators to systematically approach the tasks required to get an innovation adopted.   In addition, the AASHTO TIG's mission is to foster implementation and deployment of innovations which provides further support for use of the T^2 Toolbox by state DOTs.

It is important to note that the terminology may play a role in the endorsement of this implementation plan module. A number of those interviewed referred to deployment plans, using it synonymously with implementation plans.

Marketing (Promotion) Plan Module

Marketing Plan Module – this module will focus on a narrower and more in-depth aspect of the implementation process – promotion of the innovation or technology and communication about it. Marketing plans are documents that assist the user in identifying the promotional strategies that can be used to facilitate implementation or technology transfer activities. Marketing plans contain in-depth analysis such as: situation analysis, describing the important characteristics and features, operations, and use of the innovation and its improvement over current practices, the benefits of the innovation and the realized improvements, the profile of the market – where the innovation will be used and by whom, the market's characteristics and players and their roles, the opportunities and barriers in promoting the innovation, goals and objectives in promoting the innovation, strategies and resources required for promotion, timing of the activities, and measuring the effectiveness of the marketing planning effort.

Users' Perspectives on the Marketing (Promotion) Plan Module

The FHWA TFHRC, Resource Center, and Division Offices focused on the need for marketing planning.   Such a product would greatly assist FHWA in its efforts to foster innovation within the state DOTs. FHWA currently has personnel training opportunities for marketing and has on staff a number of marketing professionals. Yet a tool that would enable a broad range of users to more effectively apply marketing strategies to their technology transfer efforts would be very helpful. Furthermore, FHWA has selected priority market-ready technologies and innovations for promotion to the state DOTs. These technologies each need marketing or promotion to allow the states to make informed decisions regarding their decision to implement them. If the T^2 Toolbox could assist in the

promotion efforts for this kind of technology transfer situation, enhanced resource effectiveness and timesaving for FHWA and the state DOTs would be early beneficial outcomes. These benefits would be in addition to the improvements the technology adoption would accomplish.

State DOT Technical/Operational Offices: The AASHTO TIG considers a marketing plan as an integral part of the technology deployment planning and recently added a marketing plan to one of its Focus Technologies (ready-to-use technologies and innovations that promise significant improvements). (Joint-AASHTO-TIG/FWHA, 2003) Such a tool is considered one part of the overall activities required to perform the technology transfer of an innovation.

University Researchers have a need to more effectively promote the results of their research with their public and private sector clients, including state DOTs and federal agencies. Having a reliable plan to better convey the use and benefits of the research results will be a great advantage for the universities. This type of effort will produce more readily applicable research results, will help to build trust and confidence in the relationship between the university and the agency, and will importantly speed the adoption of the innovation.

An additional need for universities focuses on the student researchers. A marketing plan module would be useful for students as they participate in research efforts for research sponsors. Students generally do not know how to package their work and especially for graduate students, providing an avenue to enhance professional skills in addition to their academic knowledge is very desirable. (McNeil telephone conversation, 1/8/04)

State DOT Research Managers saw the value of a marketing plan but determined it was a lesser priority than several other process tools. The comments about marketing planning centered on not the lack of endorsement of this type of effort but the greater need for other tools. Tools such as implementation plan creation, a tool to schedule and monitor implementation activities, and the ability for the tools to assess the effectiveness of the various technology transfer and implementation activities were preferred more than marketing plan development.

LTAP/TTAP: The attitude of the technology transfer professionals working in the LTAP/TTAP environment was the marketing plan module must be sufficiently clear, easy to use, and not burdensome. Tools that are direct and without complexity will have a greater potential for use. Often LTAP/TTAP staffs do not need to perform a complete marketing plan for an innovation, but often they may be required to plan for training or technical assistance. The flexible nature of the implementation and marketing modules of the Implementation Tool can meet the needs of this community.

One caution that arose was the potential barrier the word "marketing" placed on this module. Some in the research and technical community tend not to use the word "marketing" because it still viewed with a heavy-handed, forced selling connotation. While the perceptions are changing, this part of the Implementation Tool may have broader appeal if there were an alternate name. In fact in some contexts, to circumvent the potential barrier, "implementation plan" is used to mean marketing plan.

Executive Briefing Module

The Executing Briefing Module prepares a briefing presentation for senior management, which includes the elements important at an executive level. Items included in such an executive briefing plan include, need assessment and problem description, technology or innovation description, profile, and background, current practice, market profile, risks and rewards, costs including implementation and maintenance costs, funding sources, and short- and long-term goals and objectives. (example, Pamplin, 2003)

Users' Perspectives on the Executive Briefing Module

Nearly every segment of the transportation community indicated a need for a tool that enables the individuals responsible for technology transfer or implementation of research results to create a compelling executive level briefing. Research managers, university researchers, FHWA TFRHC, Resource Center, and Division Office staff all agreed that having a tool that could produce a briefing that contained "what the top managers needed to know" would be a "winner." Therefore, this type of function is added as a module to the comprehensive Implementation Tool.

An example of successful technology transfer occurred with the Technology Deployment Work Group, comprised of the Joint Transportation Research Program at Purdue, the Indiana Department of Transportation, and the FHWA Indiana Division Office. The FHWA Division Office prepared an executive briefing on an innovation that was accepted by senior management based on the presentation.(Pamplin, 2003) The value of the high quality briefing was that an important innovation could be applied to the agency's practice much more rapidly than if they had used other means to seek approval. This type of success is a model for the executive briefing module of the Implementation Tool.

SCHEDULING AND TRACKING TOOL

A scheduling and tracking tool was seen as an important management tool for those performing implementation of research results and technology transfer activities. The users interviewed for this study again and again referred to the need for understanding of the progress and effectiveness of their efforts to bring about innovation. A scheduling and tracking tool would include technology transfer activity timelines, elements of the

processes being performed, critical accomplishments, accountability, resources needed or expended, and summary capabilities to present an overview of activities and their status.

Users' Perspectives on the Scheduling and Tracking Tool

<u>Research Managers in State DOTs</u> identified a scheduling and tracking tool for technology transfer and implementation of research results as a valuable addition to the T^2 Toolbox. Often such project management planning is recognized as necessary, yet there is little time or resources available to create them. State DOT research managers indicated that having a dynamic tool that allows them to see the progress and the scheduled events involved in the implementation process would be helpful.

<u>FHWA Division Offices</u> have a similar need for tracking the technology transfer activities for technologies and innovations that they promote to the state DOTs and Metropolitan Planning Offices. A Technology Deployment Tracking system in use at the Louisiana Division Office monitors significant events in the implementation/deployment process and aggregates these completed actions into annual performance records. The key to this system is tracking only the key events (keeping it simple and not cluttered) and having the information to put into the tracking tool. In the case of Louisiana, information is received from the division's performance plans. (Stringfellow telephone conversation 1/7/04)

A scheduling and tracking tool has many uses for the whole technology transfer or implementation process. Any individual charged with planning activities and reporting on whether they were accomplished can use such a tool; it could have wide spread use.

EFFECTIVENESS ASSESSMENT

All market segments of the technology transfer or implementation of research results process are interested in the effectiveness of their actions. In fact, a majority of potential users that were interviewed identified effectiveness assessment as an important aspect to include in the scope of the T^2 Toolbox. Moreover, performance measurement is an important concept in today's transportation environment. Researchers and technology transfer experts want to demonstrate good stewardship of the funds they are given for their activities. Also, operational staffs are continually required to "do more with less." The project panel broadly endorsed including effectiveness assessment in both primary tools. The tools will have the capability to view the effectiveness of the tool, providing a measure to determine whether the tool assisted in enhancing or facilitating the process of implementation of research results or other technology transfer activities.

ADDITIONAL GUIDANCE ON TOOLS

A few key points about the tools were suggested.

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- <u>Keep the tools simple</u>. Do not add complexity by trying to do too much. The easier the tool is to operate and the more succinct the information it generates, the more it will be used.

- <u>Terminology will be important</u>. Do substantial work to determine the most useful terms for the various tools.

- <u>Minimal resources are available</u>. In most organizations, not a lot of time or resources are dedicated to technology transfer or implementation of research results, developers of the tools must take this into consideration.

- <u>Create the tools using commonly available software</u>. Using software that the majority of the transportation community can use allows users to customize the tools so that unique elements of their programs can be accommodated.

- <u>Keep moving toward the goal of producing a web-based system</u>. The resources accessible through the Internet will substantially enhance the technology transfer and implementation experiences and the sharing of successes.

- <u>Focus on broad-based support</u>. Consider all members of the transportation community as potential sponsors, including federal and state agencies, university transportation researchers, LTAP/TTAP centers, and organizations such as TRB, AASHTO, and others.

CHAPTER 5. NEXT STEPS

There are a number of items that must be considered prior to advancing the concept of the T^2 Toolbox, such as oversight, funding, production, dissemination, and other items. This chapter puts forth some of the current thinking on the next steps for the T^2 Toolbox.

SPONSORSHIP

One of the questions that arose during the discussions about the T^2 Toolbox was who would sponsor the system and how would it be maintained. Because the T^2 Toolbox presents tools for the transportation community at large there is likely to be no one single owner of the T^2 Toolbox. However, the sponsorship of the T^2 Toolbox must be carried by responsible organizations that will provide a stable and reliable environment and reflect the broad stakeholder group the T^2 Toolbox is intended to serve.

There are several options for the sponsorship:

- A small number of major sponsors who are primary members of the transportation community
- A partnership or consortium of organizations that may be major sponsors as well as a variety of others in the transportation community – a broader based sponsorship

A small number of major sponsors would be the most direct means to begin the T^2 Toolbox initiative. However, with a small number of sponsors, the content and management decisions are limited to the sponsor organizations. Substantial input from the user community would be a desirable component for this type of arrangement. Candidate organizations are federal agencies, state DOTs, AASHTO, and University Transportation Centers.

Adding others to the major sponsors may be a viable solution. While the major sponsors have a substantial role, others added to in the partnership or consortium have influence and a role in shaping the T^2 Toolbox. The roles of the various sponsors would have to be defined to assure each sponsor is appropriately represented. This organizational structure allows for substantially more input to the content and operations and presents the opportunity for a broad segment of the transportation community to take an ownership interest in the T^2 Toolbox. The most successful vehicles for such a partnership or consortium are the AASHTO Joint Development Process and the federal-aid Pooled Fund Program, which has included academic partners as well as the core participants, the state DOTs. A unique development consortium or pooled fund project could be created and designed to meet the needs of all the sponsors.

While sponsorship often has a funding commitment associated with it, other resources, such as expertise, equipment and facilities, or other items can be a form of participation and contribution.

OVERSIGHT

Oversight of the T^2 Toolbox development will be necessary. There are two distinct roles that must be fulfilled: one, a decision making role that sets policies and standards, approves T^2 Toolbox content, and provides other similar executive management responsibilities, and two, technical decision-making, having responsibility for the physical creation of the T^2 Toolbox. It was suggested by a number of those providing input to this scoping study that a technical advisory committee should be convened for each of the modules in the Implementation Tool and for the Tracking and Scheduling Tool.

FUNDING

Funding for Development

Developing tools for the T^2 Toolbox will call for funding at several critical points. Initially funding will be required to design and develop the first stage CD format tools, which will include testing and demonstration of the tools. The second stage of the T^2 Toolbox development, creating a web-based system has funding needs as well. This second stage will be a continuation of the initial effort and will involve a transition from CD format to a web format system. Links to other technology transfer activities would be developed in this effort and include an initial process for successful practices capture and the capability to share information between and among users.

Based on similar interactive, web-based projects, current estimates for the development of the T^2 Toolbox including the cost of producing both stages, the CD version and the web-based version, with two primary tools is $500,000 – 1) a comprehensive Implementation Tool, estimated cost of $400,000, with modules for creating implementation plans, marketing plans, and executive briefings and other communications materials, and 2) a Scheduling and Tracking Tool, estimated cost of $100,000.   These estimates include testing and demonstration of the tools, but do not include other implementation activities.

Other Funding Requirements

Funding will be necessary for implementation of the T^2 Toolbox. Distribution of the tools (if not paid by users) is a major consideration. Other funding needs to be met are for user technical support, training, and promotion of the T^2 Toolbox. These types of activities will be especially important for success of the T^2 Toolbox.

Funding will also be necessary for the policy oversight committee and the technical advisory committees for each of the modules of the Implementation Tool and for the Scheduling and Tracking Tool. Administrative support for the project will be required as well. All of these costs -- other than for development -- implementation costs, the oversight and technical committees expenses, and administrative costs are candidates for sponsor support through in-kind services or non-financial resource commitments. These funding considerations are not included in the development estimates above.

Investment for the Future

Developing the T^2 Toolbox is an investment in the transportation system. The tools it contains will multiply the benefits of the current implementation efforts. In particular the T^2 Toolbox will allow more rapid application of innovation to transportation by maximizing efforts for implementation of research; by enhancing market penetration for innovations; and by substantially increasing the associated benefits of broader implementation. The T^2 Toolbox will help to prevent delays in adoption of better practices, enable users to avoid unseen liabilities, and assist in overcoming technical or administrative barriers in implementation. These tools need to be in the hands of practitioners to produce efficiencies and create more value for the existing and future transportation assets.

The consequences of not having the benefits of such innovations also present a strong reason to move forward with this T^2 Toolbox. Consider that without an implementation plan or a marketing strategy, labor, equipment, materials and other physical costs can rapidly multiply. Additionally, the costs are even greater for not having an innovation in place and not realizing the full benefits of the innovations and not having an efficient capability to share best practices. Developing the T^2 Toolbox is a needed investment. Through the use of its tools it will use will trim the cost of technology transfer and implementation efforts and increase the stewardship of transportation resources through more effective and rapid application of innovations.

TIME FRAME

A number of items must be scheduled to move the T^2 Toolbox from concept to reality.

Actions in the next 3 to 6 months:

- Sponsor organizations and partners identified
- Program vehicle to house the T^2 Toolbox development
- Funding identified and acquired for development of the whole project, including the CD version and the subsequent web-based system
- In-kind resource commitments for other funding needs such as implementation, oversight and technical committee costs, and administrative costs

- Selection of an oversight/policy committee

Actions needed directly following and within the next 6 months:

- Selection of technical committees to oversee development of the individual tools
- Determination of the organization(s) to develop the tools
- Approved technical content for the tools

The development effort for the T^2 Toolbox should be accomplished within 24 months after selection of an organization(s) to perform the effort.

POLICIES AND STANDARDS

Policies and standards must be set for the T^2 Toolbox. While this may be less important than determining sponsor organizations or determining funding amounts, it is necessary to understand that the T^2 Toolbox as a system will need operational and management policies and standards. These must be developed and adopted very early in the development cycle and prior to committing major funds for creating the tools. For the decision-making body, these policies and standards are some of their initial tasks.

DISTRIBUTION

Distribution of the CD based T^2 Toolbox is an issue for consideration by the policy/oversight committee. Who will get a copy? Will the users pay for a copy of the CD system or will identified funding cover an initial distribution? What is considered an initial distribution? How will the users be identified or how will users identify themselves to the supplier of the T^2 Toolbox. Each of these questions must be answered.

All who want a copy should have the opportunity to receive a copy of the CD version of the T^2 Toolbox. The most desirable answer to the question of "who pays for the CD," is to raise funds for this purpose and not allow cost to be a potential barrier to access to the T^2 Toolbox.

A substantial effort will be required to identify the potential users of the T^2 Toolbox and then to promote use of the T^2 Toolbox to these individuals or organizations.

SUSTAINING AND ENHANCING THE T^2 TOOLBOX

The most challenging aspect of developing the T^2 Toolbox is sustaining and enhancing it. Developing a CD version of the T^2 Toolbox is a one-time project that requires follow-up, but does not demand high-level continuing support. However, the two-stage process presents a special challenge. As the T^2 Toolbox gains users and is successfully applied to transportation technology transfer and implementation tasks, it will be tempting to declare

victory and not make the step to the web-based second stage. A web-based system presents a set of responsibilities not associated with the production of the CD. The web-based T^2 Toolbox will require residency in a server, support of the application at that site, and some degree of technical support for users. The funding and organizational structure created must be stable and reliable for the life of the T^2 Toolbox, commitments from sponsors for multiple-year support are critical, and a dedication to keeping pace with the advancements in web-based technology over time is essential.

CHAPTER 6. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

SUMMARY

Now is the time to develop the T^2 Toolbox because there is a large base of support within the transportation community for more effective implementation of innovative practices to advance the transportation system. This document is a call for action to move from concept to reality. The T^2 Toolbox development will be two-staged, the first stage would be an interactive CD based system with hardcopy that can be used on a personal computer or installed on an intranet (if available) within the user's organization; the second stage would advance to an interactive web-based system, accessible through commonly available internet browsers

The T^2 Toolbox will be interactive, providing prompts and suggestions for information input and will include some internal-to-the-system intelligent decision-making. Professionally formatted reports will be produced from the tools as needed.

Two primary tools are included in the T^2 Toolbox: a comprehensive Implementation Tool, which contains modules for creating an implementation plan, a marketing plan, and executive briefing presentations and reports and other communications materials, and a Scheduling and Tracking Tool to monitor implementation and technology transfer activities.

To further this concept, a number of items must be considered. They are:
- Sponsorship
- Funding and resources
- Schedule and timeframes
- Oversight of the initiative including setting policies and standards
- Management of the technical development
- Distribution of the CD system and housing of the web-based system
- Sustainability

The T^2 Toolbox will require resources to realize the contribution it could generate. Initial estimates of cost for technical development of the two major tools, which includes a CD version of the T^2 Toolbox and transitioning the tools to a web-based system is $500,000 -- Implementation Tool (including implementation plans, marketing plans, and executive briefing and communication materials) estimated cost of $400,000 and the Scheduling and Tracking Tool estimated cost of $100,000. Costs for support of an oversight/policy committee and technical advisory committees, implementation activities, and project administration are candidates for support by sponsors through in-kind services or other non-financial resources contributions.

This investment is modest compared to the costs that could occur. Without an implementation plan or a marketing strategy to prevent delays, unseen liability, or technical barriers, costs for any one project that had difficulty with implementing the innovation could reach the amount that it will take to create the initial version of the T^2 Toolbox. Additionally, if an innovation was not applied due to the lack of skills or tools to implement it or best practices were not shared narrowing the usefulness of the research investment, many more dollars would be required to apply innovations to the transportation system.

CONCLUSIONS AND RECOMMENDATIONS

Action and implementation items recommended as a result of this study are divided into three segments.

Actions in the next 3 to 6 months:

- Sponsor organizations and partners identified
- Program vehicle to house the T^2 Toolbox development
- Funding identified and acquired for development of the whole project, including the CD version and the subsequent web-based system
- In-kind resource commitments for other funding needs such as implementation, oversight and technical committee costs, and administrative costs
- Selection of a oversight/policy committee

Actions needed directly following and within 6 months:

- Selection of technical committees to oversee development of the individual tools
- Determination of the organization(s) to develop the tools
- Approved technical content for the tools

Within the first year:
- Develop a plan for sustaining the T^2 Toolbox over time

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Technology Transfer Toolbox Scoping Study
Final Report, July 6, 2004, including additional minor edits

APPENDIX A

TECHNOLOGY TRANSFER TOOLBOX SCOPING STUDY
ORGANIZATIONS AND INDIVIDUALS CONTACTED

Study Panel Members

State/Provincial DOTs

Survey to the AASHTO Research Advisory Committee yielded 34 responses from 32 state DOTs and one Canadian Province. (See Appendix B.)

Emails and telephone discussion follow-up occurred with about one quarter of these respondents.

Federal Highway Representatives

Resource Centers
- Thay Bishop – Finance Technical Service Team Leader, Atlanta, GA
- Pat Hasson – Safety and Highway Design Technical Service Team Leader, Olympia Fields, IL
- Peter Osborne – Hydraulics and Geotechnical Service Team Leader, Baltimore, MD
- Susanna Reck – Technology Deployment Specialist, Lakewood, CO

Division Offices
- David Pamplin, Quality, Research and Technology Deployment Team, Indiana Mary Stringfellow, Technology Management Systems Engineer, Louisiana

University Representatives (including Technology Transfer Professionals)

- John A. Anderson, Education Resource Group, Dixon University
- Jason Bitner, Program Manager, Midwestern Regional University Transportation Center
- Wilfrid A. Nixon, Professor of Civil Engineering, University of Iowa
- Gib Peaslee, Program Outreach Coordinator, Florida LTAP Center, University of Florida
- Sue McNeil, Director and Professor, Urban Transportation Center, University of Illinois, Chicago
- John B. Metcalf, Professor, Civil & Environmental Engineering, Louisiana State University
- Ed Stellfox, Maryland Technology Transfer Center Director, University of Maryland

Technology Transfer Toolbox Scoping Study
Final Report, July 6, 2004, including additional minor edits

APPENDIX B

TECHNOLOGY TRANSFER TOOLBOX SCOPING STUDY

RESEARCH ADVISORY COMMITTEE SHORT SURVEY

A copy of the survey and the results of the survey are below. The ranking of the preference is included for the first question and the number of responses for each item is included for the second question. Nearly half of the respondents indicated their willingness to discuss the T^2 Toolbox.

To: RAC Members

From: Barbara T. Harder
        215-735-2482
        btharder@sprintmail.com

Subj: Your help regarding effective implementation and technology transfer tools

I've been asked by the TRB committees on Technology Transfer and Conduct of Research along with the FHWA to prepare a scope for a Technology Transfer Toolbox. In that light, I'm asking a number of groups including the TRB committees and TRB state representatives (those other than RAC members), FHWA field personnel, and others for input. The committees want this toolbox to be a useful mechanism to assist those responsible for implementation of research results.

Often people performing research results implementation in state DOTs are not always technology transfer or implementation specialists and therefore may benefit by having a resource that will guide them through some of the basic processes needed for enhancing their implementation efforts. The goal is to get technology transferred and methods, processes, and products put into practice more effectively.

If there were a step-by-step guide for processes that would be of assistance, which of the following would be useful?
Please number the items, 1 being most useful, 2 next most useful, to 6, least useful of the list.

__1___ A template that maps out an implementation plan
__2___ A project management process to schedule and monitor technology
         transfer activities and implementation actions
__6___ Communications and publicity action plans
__4___ Marketing/promotion plan development for new technologies
__5___ Resource estimator for implementation and deployment activities
__3___ Technology transfer and implementation effectiveness assessment
Other _____

What is the most effective mechanism to use for the toolbox? Please consider the various people that might be using this tool: people from your office, from the operational offices, and from field offices. **Please check one only.**

__0___ Workbook (with reproducible forms), hardcopy only
__19__ Workbook accompanied by a CD (generates plans and hardcopy) that can
      be used on a PC or installed on an agency's intranet
__4__ DVD (generates plans and hardcopy) that can be used on a PC or installed
      on an agency's intranet
__10__ Web-based, requiring access to the Internet
Other _____

__16__ Would you be willing to talk about this toolbox concept with me?
Name:
Email:
Telephone number:

Thank you very much. Please return this by December 19 to btharder@sprintmail.com

APPENDIX C

SUGGESTED LIST OF COMMUNICATION OUTREACH/MARKETING TOOLS
Cheri Marti, Center for Transportation Studies, University of Minnesota
Pat Lees, Consultant, Source Information
September 2003

Instructional Activities
- Interactive workshops and training (exercises/case examples/scenarios)
- Lecture
- Computer assisted learning (web-based, CD-ROM, live on-line)
- Self-instruction workbooks
- On-the-job training/apprenticeships/job shadowing
- Coaching/mentoring
- Loaned personnel
- Video-taped courses and interactive video

Conferences and Symposia
- Key expert discussion seminar
- Symposium (focused on single topic)
- Conference (broad topic areas)
- Meeting presentations
- Electronic teleconferencing

Demonstrations
- Product demonstration
- Exhibits/trade shows
- Equipment Rodeos
- Simulations

Technical Assistance/Communications
- On-site, traveling assistance (circuit programs)
- Hotline Q & A assistance
- Internet networks (Listservs, instant messaging, chat-rooms, e-mail)
- Telephone conferencing
- Key-expert knowledge management systems
- Networking
- Cooperative "twinning" partnerships

Print and Web-Based Publications and Materials
- Web pages and links
- Brochures
- Newsletters/articles
- Best practice manuals/helpful guides/fact sheets
- Posters
- Guidelines/Specifications
- Press release/media kits
- Reports/papers/research syntheses
- Job aids and resources (flow charts/checklists)
- Promotional items